REMARKS

Entry of this Amendment is proper because it narrows the issues on appeal and does not require a further search by the Examiner.

Claims 1-20 are all the claims presently pending in the application. Claims 1, 4, and 8-9 have been amended. Attached hereto is a marked-up version of the changes made to claims by the current Amendment.

It is noted that the claim amendments are made only for more clarifying the language of the claim, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-20 currently stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ye (U.S. Patent No. 6,374,227) in view of Ausubel (U.S. Patent No. 5,905,975) in view of Talluri (U.S. Patent No. 6,263,315) and further in view of Hornick (U.S. Patent No. 5,270,921).

This rejection is respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

The present invention is directed a method for executing a combinatorial auction that includes reading input data, which comprises a plurality of items, a player bidding on the items, and a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid. The invention further includes generating proposals by utilizing the

input data, with each proposal comprising a collection of bids that can be awarded to a player participating in the auction. The bids are actual bids made and being considered simultaneously. Next, the method includes selecting a set of proposals such that each item is included in at most one selected proposal, and informing the players bidding on the items of the result of the selection of a set of proposals.

The conventional method finds an Internet auction winner by formulating the winner determination problem as an integer program and solving the program using either heuristic methods, if inexact solutions are unacceptable, or exact methods such as those implemented in commercial mathematical programming software. This approach is adequate for many auctions of commercial interest. However, as the solution can require multiple hours, or even days on a high-performance computer, it is impractical for all but the smallest instances and is most appropriate for single bid auctions.

The claimed invention provides exact solutions to combinatorial auctions having actual bids considered simultaneously, where thousands of players can specify bids for collections of items.

II. THE PRIOR ART REJECTION BASED ON YE, AUSUBEL, TALLURI AND HORNICK

The Examiner alleges that no less than four references, Ye, Ausubel, Talluri, and Hornick, would have been combined to form the claimed invention. Applicant submits, however, that these four (4) references would not have been combined absent hindsight, and further that there are

elements of the claimed invention which are neither taught nor suggested by the Examiner's claimed combination of references.

Ye discloses a method wherein shipping carriers reserve bids associated with one or more lanes or lane bundles with a unit price reflecting the per unit shipping cost in the lane (col. 3, lines 44-48). Integer programs are used and may be solved with commercially available integer program (IP) solvers, which use the branch-and-bound approach with linear programming (LP) relaxation to solve, or attempt to solve, integer programs (Ye, col. 5, lines 25-46). Ye's optimizer engine 16 uses selected bid data or more LP relaxation solutions received from IP solver 18 to construct one or more enhanced integer programs reflecting the applicable optimization problem. Optimizer engine 16 enhances a standard integer program using a cutting process, a prioritizing process, or both to help improve the process. (Ye, col. 6, lines 1-11).

In Ye, an LP relaxation solution is first generated for a root node in a branch-and-bound approach. The procedure is continued recursively, branching on each variable having fractional value in a previous LP relaxation solution, until an LP relaxation solution is found having integral solutions for all the binary variables associated with the integer program (Ye, col. 8, lines 23-30).

The Examiner admits that Ye does not disclose solving an integer program in a way that maximizes revenue and alleges that Ausubel, Talluri, and/or Hornick describe such a method and would have been combined with each other and Ye. Applicant respectfully disagrees.

The Examiner cites Talluri to disclose maximizing revenue using multidimensional value variable matrices and Hornick to disclose probabilistic demand modeling without having to resort to computationally intensive integer programming to maximize marginal revenue in a dynamic

process. The Examiner also cites Ausubel to disclose a method for determining the winning bid in an auction for multiple items that involves calculating maximized bid revenues to determine the auction's final outcome.

However, Applicant submits that these references would not have been combined as alleged by the Examiner. Indeed, these references are directed to different objectives and methods. Specifically, Ye is intended to find a more practical approach to finding a low-bidder for an auction using the cutting planes technique to solve a standard integer program (Ye col. 13, lines 45-55). As the Examiner has admitted, Ye does not disclose bidding for products nor teach a method for finding the maximum revenue of the auction. On the contrary, Ye is a method to find a low-bidder in an auction in order to save costs.

Ausubel's auction method is not relevant to Ye's disclosure of an integer program for "allocation of a resource" using a cutting-planes method in an auction to find the lowest bidder. Ausubel discloses an " English auction" for multiple-objects which publish the prices bidders are willing to pay and hides the pure private values, thereby promoting and maximizing "sincere bidding" to find the highest bidder (col. 27, lines 14-30)." There is no motivation to combine these divergent references, and further the Examiner cannot state that it is even possible to combine the two methods.

Ausubel discloses a way make comparisons of bids in the English Auction to maximize revenues. The method utilizes a series of sub-auctions where bids from each user are constrained and compared, where a current maximized bid revenues obtained in previous iterations of a bidding loop are compared with the function of the maximized bid revenues obtained in previous

iterations to determine whether to continue the process (col. 31, lines 20-65). However, Ye uses an integer program to find a lowest bidder to drive down costs, not the English Auction method nor the other methods cited by Ausubel to maximize revenues. Ye's method would not be combined with Ausubel. In fact, the Examiner has overlooked that the two references are incompatible.

The Examiner avoids the fact that Ye already contains disclosure of a prioritization process that is appropriate for the embodiment of low-bidding for shipping lanes (see col. 24, line 57 to col. 24, line 30) and that Ye actually teaches against finding a maximized revenue in the bidding process. The object of Ye's invention is to find a lowest bidder, not the highest bidder. Ye's optimizer 10 attempts to "further drive down costs"in the bidding process (col. 4, line 49). In Ye,

> [o]ptimizer 10 allows the shipper to carry out multiple rounds of bidding, which helps to further drive down costs through additional competition among carriers. After each round of bidding, optimizer 10 selects the combination of bids and reserve bids that minimized the total shipping cost over all lanes, and provides this information to some or all of the carriers involved in the bidding process. Based on this feedback information, carriers may revise their bids and reserve bids to submit new bids, in hopes of either altering the outcome or ensuring their victory. This process continues until a predetermined iteration limit is reached. Since carriers get feedback after each round of bidding and are able to revise their bids and reserve bids accordingly, costs to the shipper are typically driven down as a result of the competitive process, (col. 4, lines 49-60) (emphasis Applicant's).

The Examiner has ignored a fundamental purpose of Ye's disclosure (e.g., to drive down costs, instead of maximizing revenue). Certainly, no person of ordinary skill in the art would have considered combining these references, absent hindsight.

Further, there is no motivation to combine Talluri and/or Hornick with Ye and/or Ausubel

to form the present invention. Talluri and Hornick are clearly irrelevant to technology in the claimed invention, since neither reference teaches or suggest a bidding auction or any type of competitive bidding process. Talluri discloses a revenue management software system for a commercial airline that supports decisions to accept or deny requests for airline resources (e.g. seats, rooms, volume, weight, air time) (Talluri, Abstract).

Since Talluri does not teach an auction, the statement by the Examiner that "the motivation to combine is to teach an auction that maximizes revenue for multiple entities participating as enunciated by Talluri," (Office Action, p.3) is misleading and incorrect (emphasis Applicant's). Instead of teaching an alleged "maximizing revenue" for an auction, Talluri's disclosure attempts to match net revenue of a request with available airline resources such as airline flights and seats (col. 6, lines 63-68).

There is further no motivation or sugguestion to combine Hornick with Ye, Ausubel and/or Talluri to form the claimed invention. The Hornick disclosure is irrelevant to executing a combinatorial auction. Hornick discloses "an airline seat reservation system" that incorporates a probabilistic demand model "without resorting to computationally intractable integer programming," (Abstract).

On its face, Hornick is not a bidding auction process and does not maximize revenue for a bidding auction. Users do not bid for seats or flights, but instead the airline attempts to gain the highest profit margin from the user's desires to fly (e.g. "the total fare paid by a passenger is adjusted with a leg-based optimization method until the expected marginal seat revenues concerge [sic] with their network-optimal values"). Therefore, Hornick would not have been

combined with Ye or Ausubel to maximize revenues for a bidder as in the claimed invention.

Hornick is intended to address a completely different business decision than Talluri. Hornick discloses a method to determine pricing fares, not for allocating actual seat resources. Hornick's method seeks to find prices for both individual legs and multi-leg fares and help the airline to maximize revenue. Like Talluri, Hornick requires some forecast of probabilistic description of demand (not actual bids) at various fare levels. In Hornick, the allocation step requires only some simple network flow calculation (because it is specific to a flight network, not to general combinations of items), not the more general, robust process required for combinatorial auctions of general goods.

Given these disparate objects, problems allegedly solved, and the unusual solution offered, the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged. The prior art references themselves must suggest the desirability, and thus the obviousness, of making the combination, independent of the present invention. Therefore, there is no motivation or suggestion to combine Ye with, Ausubel, Hornick, and/or Talluri to teach the claimed invention. Certainly no person of ordinary skill in the art would consider combining such references, absent hindsight.

Therefore, the references would not have been combined as alleged by the Examiner. Further, Ausubel, Talluri, and Hornick do not make up for the deficiencies of Ye, so that even if the references would have been combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, the Examiner further alleges that the Abstract and column 5, line 41 to column 7, line 20 of Talluri teaches maximizing revenue using multidimensional value variable matrices. The Examiner is incorrect.

Additionally, Talluri does not provide actual bids. It provides a decision support tool for on-line accept/reject decisions for airline reservations (including multi-leg flights). A clear difference is that the claimed invention comprises a large number of bids that are collected and considered simultaneously, and then the revenue maximizing feasible combination is selected. Talluri (nor any of Ye Aushel and/or Hornick) has no teaching or suggestion of generating proposals by utilizing the input data with "each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously," as disclosed in claims 1, 6, and 8-10 (emphasis Applicant's).

In Talluri, a single reservation is considered and analyzed with respect to a probabilistic (stochastic) description of future reservations that might arrive. The reservation might be for multiple flight legs, but it is still a single reservation. The single reservation is either accepted or rejected immediately, depending on whether or not it exceeds some price threshold that is computed based on expected displaced revenue from future bids that may arrive. This type of airline reservation system is a different technology for a different aim and does not teach or suggest the claimed invention.

Further, the Examiner alleges Figures 4-25 and the Abstract of Hornick teach the claimed invention. Again, this is incorrect. Hornick's disclosure is intended to address a completely different business decision. It is used for pricing airline fares, not for allocating actual seat resources to existing reservations. Hornick has no actual bids in an auction. Hornick seeks to

find prices for both individual legs and multi-leg fares that are in some sense consistent, and help the airline to maximize revenue. There is no teaching or suggestion of "bids being actual bids made and being considered simultaneously," as disclosed in the claims. (emphasis Applicant's).

Like Talluri, Hornick does not provide the actual profit under a known demand corresponding to a specific set of bids. In Hornick, the allocation step requires only some simple network flow calculation, specific to a flight network and not a general combination of items in the claimed invention.

The claimed invention, however, provides actual bids in method for executing a combinatorial auction. It is a robust process that is required for combinatorial auctions of general goods. Thus, turning to the exemplary language of claim 1 (and substantially and similarly in independent claims 6 and 8-10), there is no teaching or suggestion of "*[a] method for executing a combinatorial auction, the method comprising:*

reading input data comprising:

a plurality of items;

a player bidding on the items; and

a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

selecting a set of proposals such that each item is included in at most one selected

proposal; and

informing the players bidding on the items of the result of said selecting a set of proposals," (emphasis Applicant's).

For at least the reasons stated above, Applicant respectfully submits that the cited reference fails to teach or suggest every feature of claims 1-20. Therefore, the subject matter of claims 1-20 is fully patentable over the cited references.

Based on the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejection.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to withdraw the rejection and pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner may contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Applicant's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: 4/15/03

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CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner Geoffrey R. Akers, Group Art Unit # 3624 at fax number (703) 872-9327 this 15th day of April, 2003.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (Twice Amended) A method for executing a combinatorial auction, the method comprising:

[(1)] reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

[(2)] generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(3)] selecting a set of proposals such that each item[s] is included in at most one selected proposal; and

[(4)] informing the players bidding on the items of the result of said selecting a set of proposals.

4. (Twice Amended) A method according to claim 1, wherein [step (3)] said selecting a set of proposals is enabled by using an integer programming technique.

6. (Twice Amended) A method for selecting a set of bids in a combinatorial auction for at least two items involving at least one player and at least one type of bid for each player such that:

(a) each item[s] is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collections of bids satisfying (a) and (b) the selected bids maximizing total revenue, said method comprising:

[(1)] generating all valid proposals, said proposals comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(2)] formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraints representing conditions (a) and (b) respectively, and an objective function which represents revenue;

[(3)] solving the integer program for selecting the set of proposals that maximizes revenue;

and

[(4)] constructing a set of winning bids from the set of winning proposals.

8. (Twice Amended) A method for selecting a set of bids in a combinational auction for at least two items involving at least one player and at least one type of bid for each player such that

(a) each item[s] is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collection of bids satisfying (a) and (b) the selected bids maximized total revenue, said method comprising:

[(1)] generating a set of valid [porposals] proposals, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(2)] formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraint representing conditions (a) and (b) respectively, and an objective function which represents revenue;

[(3)] solving a linear programming relaxation of the integer program in said formulating an integer program for obtaining dual variables associated with each of the constrains;

[(4)]using dual variables obtained in said solving a linear programming relaxation for determining the excess value associated with each bid, and a threshold for each player;

[(5)] using a proposal generation method for selecting each player and type, a proposal for which the excess value exceeds the threshold, or determining that no such proposal exists;

[(6] adding the proposal generated in said using a proposal generation method and repeating said solving a linear programming relaxation, said using dual variables, and said using a proposal generation method until no new proposals are identified;

[(7)] solving the integer program that includes all identified proposals; and

[(8)] constructing a set of winning bids from the set of winning proposals.

9. (Twice Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for executing a combinatorial auction, said method steps comprising:

[(1)] reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

[(2)] generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(3)] selecting a set of proposals such that each item[s] is included in at most one selected proposal; and

[(4)] informing the players bidding on the items of the result of said selecting a set of proposals.

10. (Twice Amended) A computer comprising:

(1) means for reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

(2) means for generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

(3) means for selecting a set of proposals such that each item is included in at most one selected proposal;

(4) means for informing the players bidding on the items of the results in said means for selecting.